

## CLAIMS

What is Claimed is:

1. A minimum signature solid propellant formulation comprising:
  - about 6.0 to about 9.0 weight % of at least one polymeric binder;
  - about 21 to about 28 weight % of at least one energetic plasticizer;
  - about 17 to about 25 weight % of neat ammonium dinitramide having a particle size of about 20  $\mu\text{m}$  to about 60  $\mu\text{m}$  as a neat ADN oxidizer;
  - and
  - about 35 to about 45 weight % of ammonium dinitramide prills having a particle size of about 100  $\mu\text{m}$  to about 200  $\mu\text{m}$  as an ADN prills oxidizer.
2. The solid propellant formulation of Claim 1, wherein said binder is selected from the group consisting of polycaprolactone and poly(diethyleneglycol-4,8-dinitraza undeconate).
3. The solid propellant formulation of Claim 1, wherein said plasticizer is selected from the group consisting of butanetriol trinitrate, trimethylolethane trinitrate, n-n-butyl-N-(2-nitroxyethyl)nitramine and any combination thereof.
4. The solid propellant formulation of Claims 1, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, a crosslinker, a burn rate modifier and a bonding agent.
5. The solid propellant formulation of Claim 4, wherein said curative is selected from the group consisting of hexamethylene diisocyanate, m-tetramethylxylene

diisocyanate, dimeryl diisocyanate, toluene diisocyanate, polymeric hexamethylene diisocyanate, isophorone diisocyanate, biuret triisocyanate and any combination thereof.

6. The solid propellant formulation of Claim 4, wherein said cure catalyst is selected  
5 from the group consisting of triphenyl bismuth triphenyltin chloride, dibutyltin diacetate and dibutyltin dilaurate.
7. The solid propellant formulation of Claim 4, wherein said stabilizer is selected from the group consisting of N-methyl-p-nitroaniline and 2-NDPA (2-nitrodiphenylamine).
- 10 8. The solid propellant formulation of Claim 4, wherein said burn rate modifier is carbon black.
9. The solid propellant formulation of Claim 4, wherein said crosslinker is nitrocellulose.
10. The solid propellant formulation of Claim 1, wherein said solid propellant further  
15 comprises CL-20.
11. A minimum signature solid propellant formulation comprising:
  - about 6.0 to about 9.2 weight % of at least one polymeric binder;
  - about 21 to about 28 weight % of at least one energetic plasticizer; and
  - about 55 to about 68 weight % of neat ammonium dinitramide having a  
20 particle size of about 20  $\mu\text{m}$  to about 60  $\mu\text{m}$  as a neat ADN oxidizer.
12. The solid propellant formulation of Claim 11, wherein said polymeric binder is polycaprolactone.
13. The solid propellant formulation of Claim 11, wherein said energetic plasticizer

comprises:

about 4.0 to about 6.0 weight % of butanetriol trinitrate;

about 7.0 to about 9.0 weight % of trimethylolethane trinitrate; and

about 10.0 to about 13.0 weight % of n-n-butyl-N-(2-

5                      nitoxyethyl)nitramine.

14.     The solid propellant formulation of Claim 11, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, crosslinker, a burn rate modifier and a bonding agent.

15.     A minimum signature solid propellant formulation comprising:

10                      about 6.0 to about 9.2 weight % of at least one polymeric binder;

about 21 to about 28 weight % of at least one energetic plasticizer;

about 17 to about 25 weight % of neat ammonium dinitramide having a  
particle size of about 20  $\mu\text{m}$  to about 60  $\mu\text{m}$  as a neat ADN oxidizer;  
and

15                      about 35 to about 45 weight % of ammonium dinitramide prills having a  
particle size of about 100  $\mu\text{m}$  to about 200  $\mu\text{m}$  as an ADN prills  
oxidizer.

16.     The solid propellant formulation of Claim 15, wherein said polymeric binder is polycaprolactone.

20     17.     The solid propellant formulation of Claim 15, wherein said energetic plasticizer comprises:

about 4.0 to about 6.0 weight % of butanetriol trinitrate;

about 7.0 to about 9.0 weight % of trimethylolethane trinitrate; and

about 10.0 to about 13.0 weight % of n-n-butyl-N-(2-nitoxyethyl)nitramine.

18. The solid propellant formulation of Claim 15, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, crosslinker, a burn  
5 rate modifier and a bonding agent.

19. The solid propellant formulation of Claim 15, wherein said energetic plasticizer comprises:

about 5.0 to about 12.0 weight % of butanetriol trinitrate; and

about 15.0 to about 22.0 weight % of trimethylolethane trinitrate.

10 20. The solid propellant formulation of Claim 19, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, crosslinker, a burn rate modifier and a bonding agent.

21. A minimum signature solid propellant formulation comprising:

about 6.0 to about 10.5 weight % of at least one polymeric binder;

15 about 12 to about 32 weight % of at least one energetic plasticizer; and

about 50 to about 65 weight % of neat ammonium dinitramide having a

particle size of about 20  $\mu\text{m}$  to about 60  $\mu\text{m}$  as a neat ADN oxidizer;

22. The solid propellant formulation of Claim 21, wherein said polymeric binder is polyglycidal nitrate.

20 23. The solid propellant formulation of Claim 21, wherein said energetic plasticizer comprises:

about 0 to about 7.0 weight % of said butanetriol trinitrate;

about 10.0 to about 15.0 weight % of said trimethylolethane trinitrate; and

about 2.0 to about 10.0 weight % of said n-n-butyl-N-(2-nitoxyethyl)nitramine.

24. The solid propellant formulation of Claim 21, further comprising at least one member selected from a curative, a stabilizer, a cure catalyst, a burn rate catalyst
- 5 and a bonding agent.